

REMARKS

This application has been reviewed in light of the Office Action dated April 6, 2006. In view of the foregoing amendments and the following remarks, favorable reconsideration and withdrawal of the rejections set forth in the Office Action are respectfully requested.

Claims 10-22 are pending. Claims 10, 17, 18, 21 and 22 have been amended. Support for the claim changes can be found in the original disclosure, and therefore no new matter has been added. Claims 10, 18, 21 and 22 are in independent form.

Claims 10-16 and 18-22 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,493,109 (*Takamura et al.*).

Claim 17 was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Takamura et al.* in view of U.S. Patent No. 5,539,433 (*Kawai et al.*).

Without conceding the propriety of the rejections, the independent claims have been amended. For at least the reasons set forth below, the independent claims as amended are believed allowable over the cited art.

Independent Claim 10 recites, *inter alia*, (1) a printhead substrate having an ink supply opening, (2) an array of printing elements provided along the ink supply opening and divided into a plurality of groups of printing elements, and (3) an array of driving circuits provided along the ink supply opening and arranged to correspond to the printing elements, respectively, for driving the corresponding printing elements, respectively, (4) wherein data supply means comprises a plurality of shift registers, the plurality of shift registers are provided at both longitudinal ends of the ink supply opening, and each shift register is arranged to supply driving data to one or more of the driving circuits for driving the corresponding printing

elements, of the plurality of groups of printing elements, which are closer than non-corresponding printing elements to the shift register. Each of independent Claims 18, 21 and 22 (directed to a print head, a print head cartridge, and a printing apparatus, respectively) recites features similar or identical to these features recited in Claim 10.

An advantage of the claimed invention is that it precludes the need for a long and winding wiring for transferring a print signal, e.g., extending from one end on a print head substrate where data supply means is provided to the other end where (a portion of the) printing elements are provided. This contributes significantly to downsizing the area required for wiring, and thus to reducing the size of the substrate. In addition, since common signal lines are provided for each of the plurality of groups of printing elements, with print element selection signals being supplied via the common signal lines, it is possible to realize unified driving timing control over the groups.

Takamura et al. relates to a print head driving apparatus and printer using the same. The apparatus includes a printing data number control circuit, a shift register, a latch circuit and a driving waveform selecting circuit. However, nothing in *Takamura et al.* is seen that would teach or suggest at least (1) a print head substrate having an ink supply opening, (2) an array of printing elements provided along the ink supply opening and divided into a plurality of groups of printing elements, and (3) an array of driving circuits provided along the ink supply opening and arranged to correspond to the printing elements, respectively, for driving the corresponding printing elements, respectively, (4) wherein data supply means comprises a plurality of shift registers, the plurality of shift registers are provided at both longitudinal ends of the ink supply opening, and each shift register is arranged to supply driving data to one or more of the driving circuits for driving the corresponding printing elements, of the plurality of groups

of printing elements, which are closer than non-corresponding printing elements to the shift register.

With regard to the recited ink supply opening, nothing in *Takamura et al.* is understood to teach or suggest this element recited in the independent claims.

With regard to the printing elements (recited in the version of the independent claims presented in the last Amendment, filed on December 7, 2005), the Office Action cites Fig. 17 (buffers 55₁₁-55_{1n}, 55₂₁-55_{2n}, output pins D01-D0n) and col. 8, lines 40-44 of *Takamura et al.* However, nothing in the cited portion or elsewhere in *Takamura et al.* is understood to teach or suggest the positional arrangement of the printing elements with respect to an ink supply opening, as recited in the independent claims. Since *Takamura et al.* is not understood to teach or suggest an ink supply opening, *a fortiori* it is not understood to any positional arrangement with respect to the same. In addition, it noted that Fig. 17 is a “circuit block diagram” (col. 3, line 23; emphasis added) and hence does not indicate the physical arrangement of the elements depicted therein.

With regard to the driving circuit (recited in the version of the independent claims presented in the last Amendment, filed on December 7, 2005), the Office Action cites Fig. 17 (driving waveform forming circuit 541) and col. 8, lines 40-44 of *Takamura et al.* However, nothing in the cited portion or elsewhere in *Takamura et al.* is understood to teach or suggest the positional arrangement of the driving circuits with respect to an ink supply opening, as recited in the independent claims. Since *Takamura et al.* is not understood to teach or suggest an ink supply opening, *a fortiori* it is not understood to any positional arrangement with respect to the same. In addition, as noted, Fig. 17 is a circuit block diagram and hence does not indicate the physical arrangement of the elements depicted therein.

With regard to the shift registers (recited in the version of the independent claims presented in the last Amendment, filed on December 7, 2005), the Office Action cites Fig. 17 (n-bit shift registers 521, 522) and col. 10, lines 4-6 of *Takamura et al.* However, nothing in the cited portion or elsewhere in *Takamura et al.* is understood to teach or suggest the positional arrangement of the shift registers (a) with respect to the ink supply opening or (b) with respect to driving circuits for driving corresponding printing elements, which are relatively closer to the shift register, as recited in the independent claims. Since *Takamura et al.* is not understood to teach or suggest an ink supply opening, *a fortiori* it is not understood to any positional arrangement with respect to the same. In addition, as noted, Fig. 17 is a circuit block diagram and hence does not indicate the physical arrangement of the elements depicted therein. Thus, even if Fig. 17 be deemed to illustrate shift registers, driving circuits, and/or printing elements, it indicates merely the circuit or electrical connections between these elements and not the physical layout thereof or the positional relationships therebetween. It is further noted that all of the figures in *Takamura et al.* are either circuit block diagrams or signal timing charts, and hence none of those figures indicates any physical layout of elements or positional relationships between elements.

Kawai is cited in the Office Action as teaching subject matter of dependent Claim 17. Even if *Kawai* be deemed to teach what the Office Action alleges it teaches, nothing in *Kawai* is understood to remedy the above-discussed deficiencies of *Takamura et al.* with respect to the independent claims.

Since neither *Takamura et al.* nor *Kawai*, whether taken singly or in combination (even assuming, for the sake of argument, that such combination were permissible),

contains all of the elements of any of the independent claims, the independent claims are believed allowable over those documents.

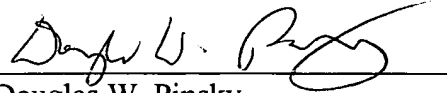
A review of the other art of record has failed to reveal anything which, in Applicant's opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. These claims are therefore believed patentable over the art of record.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "Douglas W. Pinsky", is written over a horizontal line.

Douglas W. Pinsky
Attorney for Applicant
Registration No. 46,994

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3801
Facsimile: (212) 218-2200
DWP/klm

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